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# Risk-based microbiological criteria to control *Campylobacter* in broiler meat

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Using the EU baseline survey data<sup>1</sup> and an existing risk assessment model<sup>2,3</sup>, we evaluate the public health impact of “risk-based” microbiological criteria (MCs) for *Campylobacter* at the end of the processing line for 25 different countries in Europe. This provides a practical tool for food safety risk managers to choose the MC that provides the best balance between cost (non-compliant food batches) and benefit (potential public health risk reduction).

## Introduction

Microbiological Criteria (MCs) are considered a suitable practical tool to control *Campylobacter* on broiler meat. However, it is unclear which MC will be most efficient. We propose a method to evaluate MCs on the basis of available data and models.

## Method

We used the *Campylobacter* prevalences and the distributions of concentrations on broiler skins after industrial processing in 25 countries from the 2008 EU baseline survey<sup>1</sup>.

This was input for a risk assessment model that links these data to the human health risk attending a batch of broiler meat<sup>2,3</sup>.

It was also input for a model simulating the sampling and evaluation of MCs. In no more than  $c$  out of  $n$  samples taken from a batch of broiler meat more than  $m$  cfu/g should be found.

For each country, and a given MC, this provides the percentage of batches not complying with the MC, **BNMC**.

The residual risk in the complying batches, divided by their current risk, is the minimum relative residual risk **MRRR**.

This MRRR represents the maximum risk reduction, obtained if the meat of all non-complying batches does not enter the market (without an intervention that inactivates *Campylobacter*).

## Results

- We obtain risk estimates for different European countries, that can be compared with the risk of complying batches and BNMC (figs 1 and 2).
- BNMC correlates better with the risk estimate than the prevalence does (fig 3).
- The relation between MRRR and BNMC (fig 4) shows that the MC is effective (i.e. 1-MRRR is always larger than BNMC).
- The effects of different MCs can be compared to select the most appropriate MC (fig 5). It shows that a low residual risk is associated with a high percentage of non-complying batches. From this, risk managers can choose the MC that best balances benefit (MRRR) and cost (BNMC).

## Conclusions

- Risk assessment has an added value in the definition of efficient Microbiological Criteria.
- The risk associated with *Campylobacter* on broiler meat differs strongly between European countries.
- The implementation of an MC for *Campylobacter* may be an effective method to reduce consumer risks.
- The impact of an MC in different countries in terms of batch compliance and risk reduction differs strongly between European countries.
- The effectiveness of implementing an MC on consumer risk can be evaluated directly, without formulating of FSO or PO.

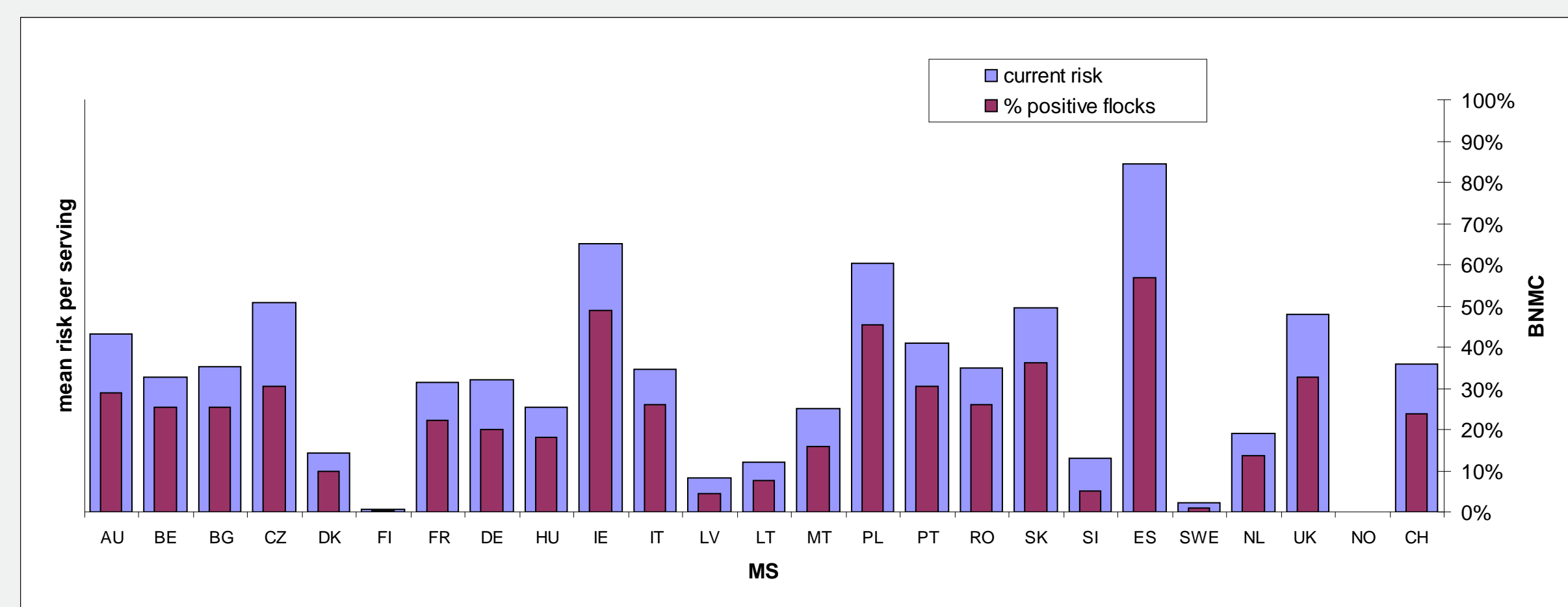


Fig 1. Public health risks of *Campylobacter* on broiler meat in different European countries as assessed from the EU baseline survey data<sup>1</sup>, and the residual risks of batches complying with the MC  $n=5$ ,  $c=1$ ,  $m=1000$ .

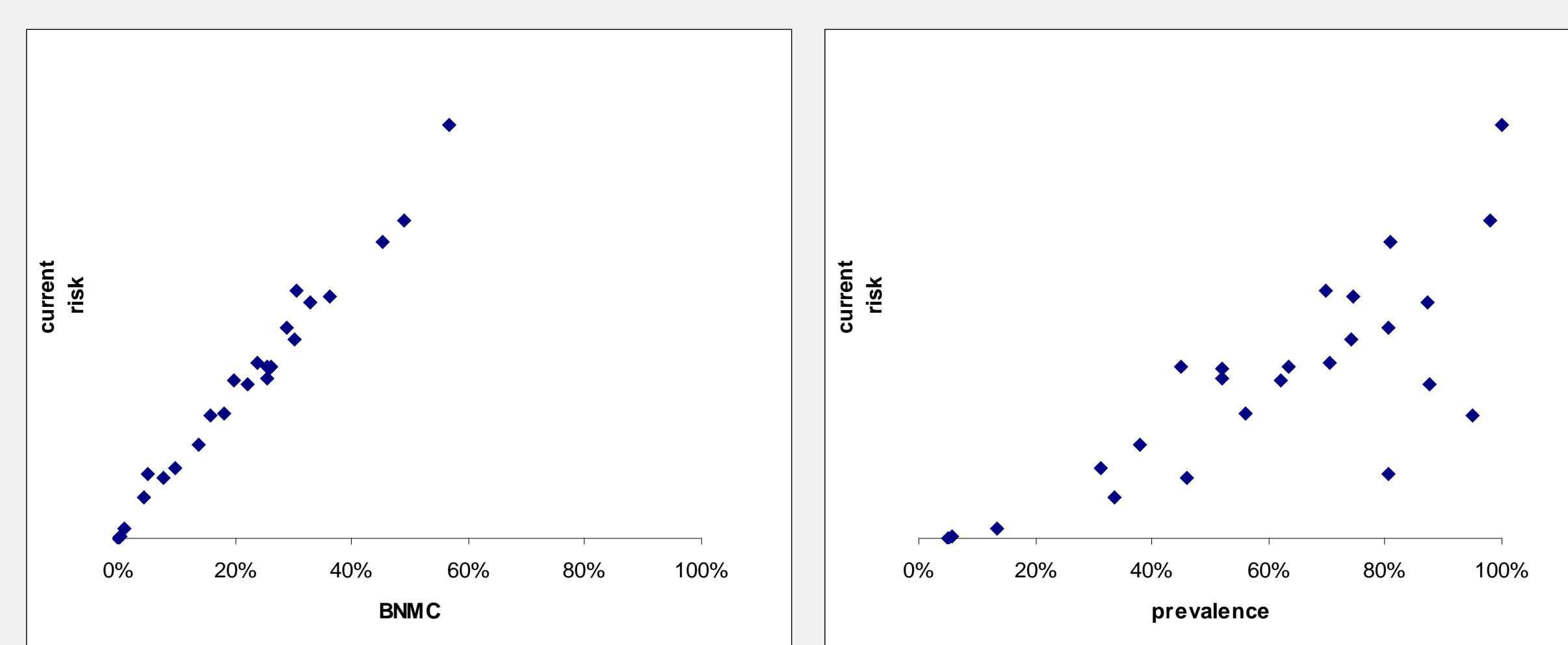


Fig 2. The public health risks in different European countries and the percentages of non-complying batches with the MC  $n=5$ ,  $c=1$ ,  $m=1000$ .

Fig 3. An interesting result from our analysis is that the BNMC value correlates better with the public health risk in a country than the prevalence does. (Each dot represents a country.) Compared to BNMC, prevalence is not such a good indicator of the actual “risk based” *Campylobacter* status. (MC  $n=5$ ,  $c=1$ ,  $m=1000$ ).

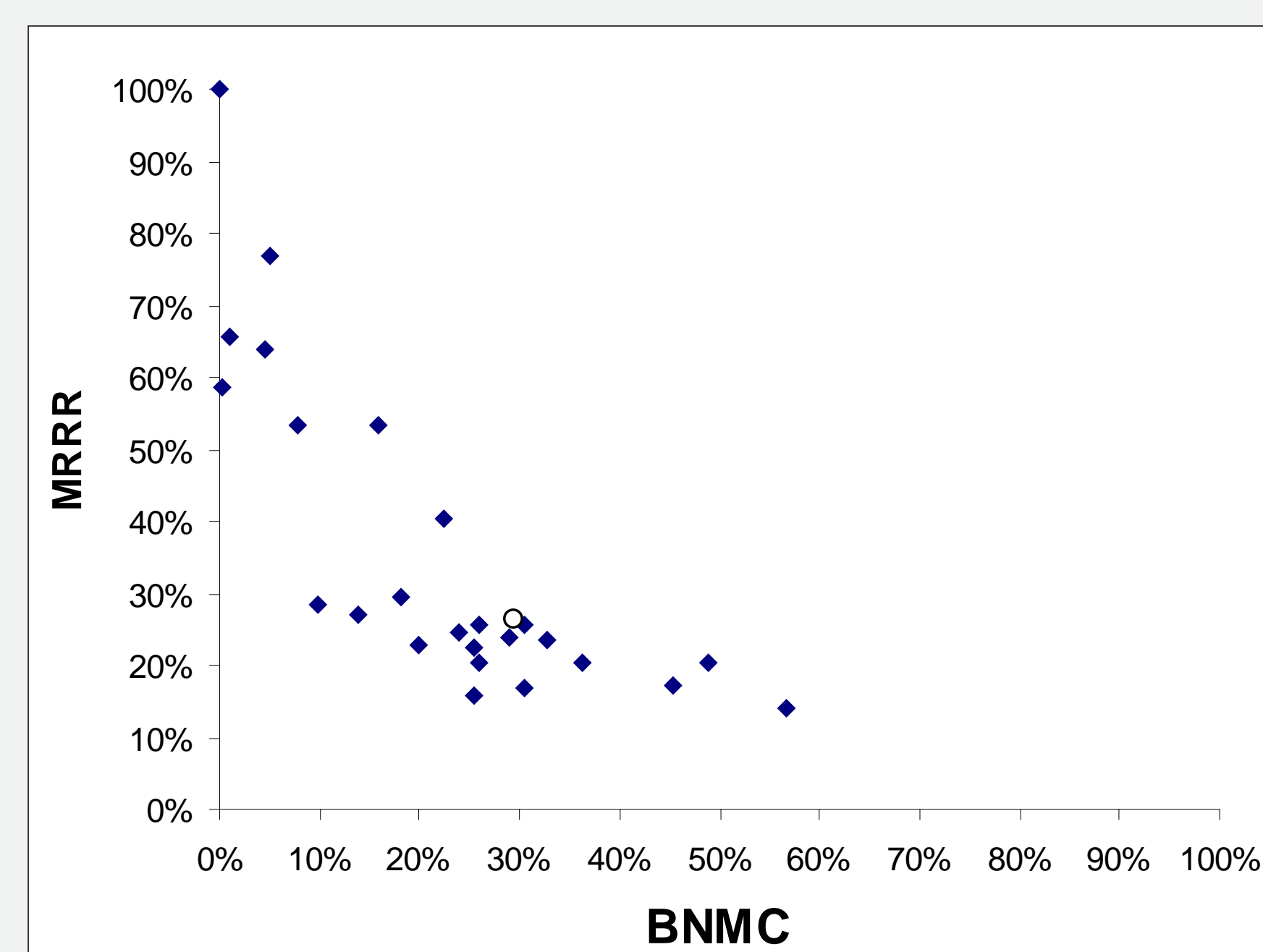


Fig 4. The relation between the percentage of non-complying batches (BNMC) and the minimum relative residual risk (MRRR) for different countries, for the MC  $n=5$ ,  $c=1$ ,  $m=1000$ . Each dot represents a European country. The circle shows the weighted EU mean.

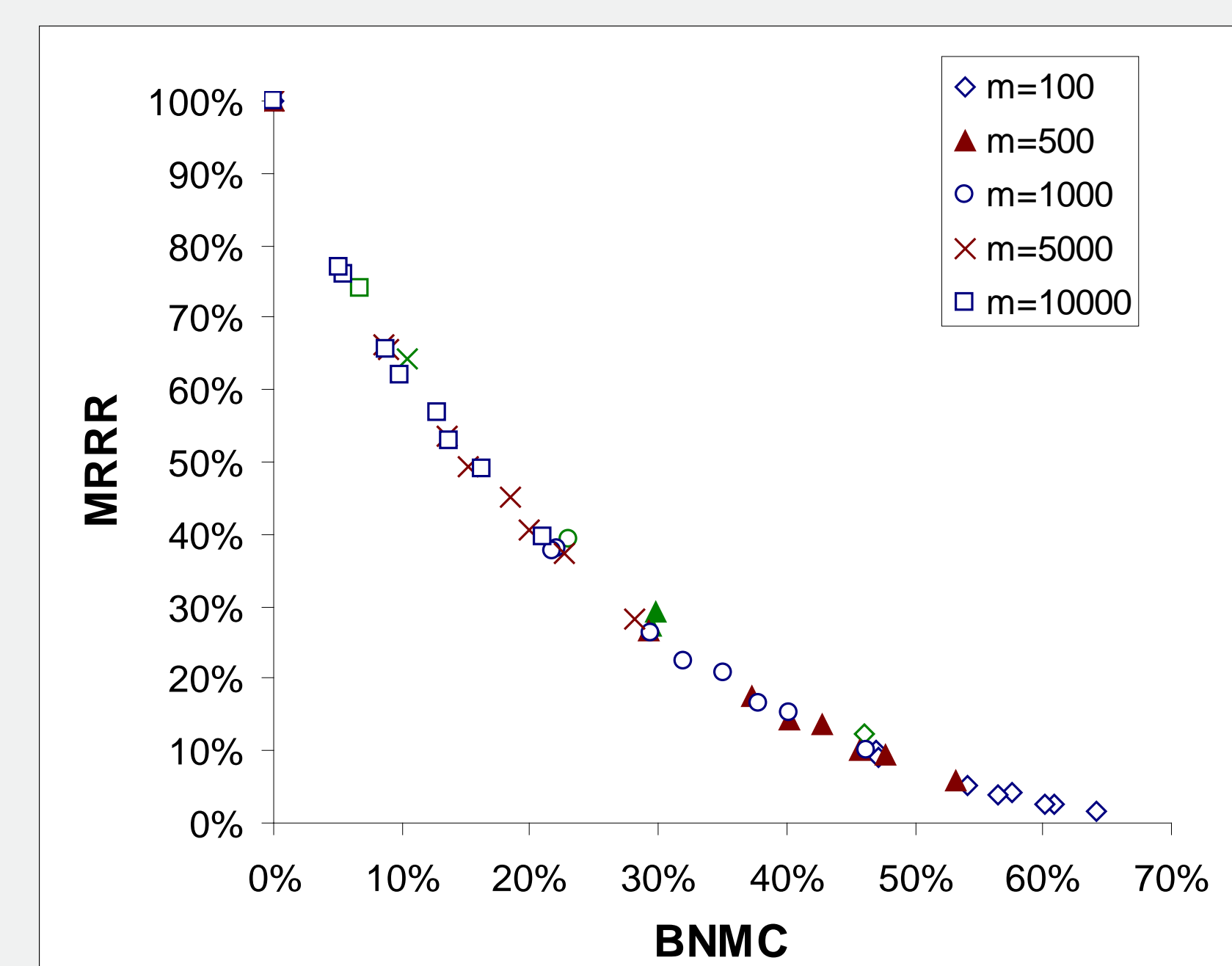


Fig 5. The balance between MRRR and BNMC for different MC sampling schemes and critical values. Results are given for the EU weighted means. Each dot represents a different combination of  $\{m, n, c\}$  values, the different values of  $m$  are given with different symbols to illustrate that with a decrease of the critical concentration  $m$  MRRR decreases and BNMC increases.

The green dots indicate results for sample size  $n=1$  and  $c=0$ . They show that MCs based on small sample size are just a little less effective.

## References

- <sup>1</sup>EFSA Baseline survey, Part A, EFSA Journal 2010; 8(3):1503
- <sup>2</sup>Nauta, M. and Christensen B. (2011), Risk Analysis 31:255
- <sup>3</sup>EFSA Opinion on *Campylobacter* control, EFSA Journal 2011; 9(4):2105

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